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MANAGEMENT BRIEF

Escapement of Fishes from Modified Fyke Nets with Differing Throat Configurations

Bradley J. Smith*
Department of Natural Resource Management, South Dakota State University, Box 2140B, Brookings, South Dakota 57006, USA

Brian G. Blackwell
South Dakota Department of Game, Fish, and Parks, 603 East 8th Avenue, Webster, South Dakota 57274, USA

Melissa R. Wuellner, Brian D. S. Graeb, and David W. Willis[1]
Department of Natural Resource Management, South Dakota State University, Box 2140B, Brookings, South Dakota 57006, USA

Abstract
We performed a field experiment in five eastern South Dakota lakes to investigate fish escapement differences between modified fyke nets with two common throat configurations (restricted and unrestricted). Nets with restricted and unrestricted throats were deployed in pairs for 24 h on similar habitat. Captured fish were measured for TL and were given day-specific marks. The paired nets were redeployed, and marked fish were randomly assigned to be stocked into the restricted or unrestricted net for 24 h; stocking densities (stratified into low, medium, and high) were species specific. Marked fish that were retained after 24 h were used to quantify escapement, whereas newly captured fish were used to estimate differences in mean CPUE and size structure. Mean CPUE of Black Bullheads *Ameiurus melas*, Black Crappies *Pomoxis nigromaculatus*, and Bluegills *Lepomis macrochirus* approximately doubled when restricted nets were used. Mean TL of Black Crappies was 31 mm greater (95% confidence interval [CI] = 6–57 mm greater) and mean TL of Bluegills was 21 mm greater (95% CI = 8–35 mm greater) in restricted nets than in unrestricted nets. Escapement from restricted nets was 4.4% for Black Crappies and 10.3% for Bluegills, whereas escapement from unrestricted nets was 71.7% for Black Crappies and 58.4% for Bluegills. We urge researchers to consider the influence of varying fyke-net throat configurations on calculated population metrics, and we recommend inclusion of the restricted throat feature in gear specifications for North American standard modified fyke nets.

Many gears and techniques exist for sampling fishes, and efforts are underway to standardize the gears used to sample North American freshwater fishes so as to improve the comparability of data (Bonar and Hubert 2002). Passive entrapment gears are common for sampling fishes in lotic and lentic systems, and numerous studies have identified differences in selectivity among gear types (Hubert 1996). Modified fyke nets are among the most commonly used entrapment gears for actively moving fish (e.g., centrarchids, ictalurids, esocids, and percids) in lentic systems (Miranda and Boxrucker 2009; Pope et al. 2009). However, minor differences in bar mesh size, frame diameter (Willis et al. 1984; Gritters 1997; Fischer et al. 2010), and throat diameter (Shoup et al. 2003) are known to produce bias. Information on the bias associated with differing throat configurations (i.e., throat restrictions) that are designed to reduce escapement from modified fyke nets is lacking (Porath et al. 2011).

Sampling of fish by entrapment gear requires the fish to encounter the net, become trapped, and be retained until the gear is checked (Hubert 1996). Varying levels of throat restriction can influence a net's ability to retain fish (Hansen 1944; Porath et al. 2011). Retention and escapement of trapped fish from modified fyke nets have been quantified for several species (e.g., Brown Bullhead *Ameiurus nebulosus*, Bluegill

*Corresponding author: bsmit8761@gmail.com
[1]Deceased.
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Lepomis macrochirus, and Largemouth Bass *Micropterus salmoides*), with higher escape rates being attributed to fish size and behavioral attributes (Latta 1959; Patriarche 1968). However, fish escapement from modified fyke nets with varying throat configurations, including restricted and unrestricted forms, remains an unquantified source of bias. In hoop nets, restricted throats reduce fish escapement by creating a physical barrier to prevent fish from swimming out of the cod end (Hansen 1944; Porath et al. 2011).

Fish escapement rates may be influenced by the presence of predatory fish in the net. Counterintuitively, some prey fish species are less likely to leave a net that is stocked with a single piscivorous fish than to leave a net that lacks such a predator (Breen and Ruetz 2006). Escapement can also be influenced by the density of conspecifics in the net (Patriarche 1968). Escapement of Channel Catfish *Ictalurus punctatus* from hoop nets with restricted throats is largely unaffected by fish density in the net, whereas escapement from unrestricted nets can be double at low fish densities and triple at high fish densities (Porath et al. 2011).

The presence or absence of restricted throats in modified fyke nets has not been specified in texts on freshwater fish sampling. We suspected that modified fyke nets with restricted throats would (1) yield higher CPUE estimates due to lower escapement rates and (2) sample larger individuals of commonly collected species (e.g., Black Crappie *Pomoxis nigromaculatus* and Bluegill). To quantify this largely unexplored potential source of bias associated with modified fyke nets, we performed a field experiment to compare differences in mean CPUE, escapement, and potential size-selective bias from modified fyke nets with and without restricted throat configurations.

METHODS

Study area.—Sampling was completed at five eastern South Dakota lakes: Pickerel Lake (June 2013), South Buffalo Lake (June–July 2014), Lake Mitchell (July 2014), Enemy Swim Lake (July 2014), and Clear Lake (September 2014). Pickerel, South Buffalo, Enemy Swim, and Clear lakes are located in the northeastern portion of the state and are of natural glacial origin. Lake Mitchell is an impoundment located in the southeastern region of South Dakota. The study lakes range from 192 to 868 ha and are generally shallow (<10 m) and eutrophic, with fish communities variously dominated by species belonging to the families Percidae, Ictaluridae, Esocidae, and Centrarchidae (Table 1; Stukel 2003).

Gear description.—We used North American standard modified fyke nets that were constructed to the specifications described by Bonar et al. (2009). The recommended North American standard modified fyke net has two 0.9- × 1.8-m frames with four 0.77-m-diameter hoops, all constructed of 10-mm rolled steel and 13-mm bar mesh; a single throat is located between hoops 1 and 3, tapering to an opening of 165 mm. Restricted nets were configured with a restricted throat that was constructed with 24 lengths of black number-15 (1.32-mm-diameter) twine (~380-mm-long), whereas unrestricted nets were left without this modification (Figure 1).

Experimental design.—Paired nets (restricted and unrestricted) were set approximately 100 m from each other within similar habitat at sites used for annual lake surveys by the South Dakota Department of Game, Fish, and Parks. Effort for restricted and unrestricted nets was approximately equal within a given lake, but total effort varied among lakes depending on the surface area (Table 1). All nets were pulled after 24 h, and fish that were captured in each net type were measured for TL (mm), given a day-specific fin clip, and placed in a net pen. Net pairs (restricted and unrestricted) were redeployed at new sites each day, and marked fish were randomly assigned to be stocked into the paired nets at species-specific densities. Historic net catch data from 16 eastern South Dakota lakes were used to designate low, medium, and high stocking densities for each species; individual net catches corresponding to the 25th percentile were judged to be low, catches between the 25th and 75th percentiles were medium, and catches above the 75th percentile were high. In the case of medium stocking density, we generally used the median value. The nets within a pair were stocked with equal species-specific densities of known-length fish. We sought to obtain replicates of all three stocking densities for each species in every lake, but small sample sizes prevented us from replicating the high-density treatments in several of the lakes. After 24 h, all of the

TABLE 1. Description of eastern South Dakota lakes that were sampled by using North American standard modified fyke nets with or without restricted throats.

Lake	Surface area (ha)	Maximum depth (m)	Trophic state	Effort (net-nights): Restricted net	Effort (net-nights): Unrestricted net	Sample period: Month	Sample period: Year
Clear	192	6.7	Mesotrophic–eutrophic	17	18	Sep	2014
Enemy Swim	868	7.9	Mesotrophic–eutrophic	12	13	Jul	2014
Mitchell	271	8.8	Eutrophic	11	11	Jul	2014
Pickerel	397	12.5	Eutrophic	12	12	Jun	2013
South Buffalo	724	4.3	Eutrophic	16	18	Jun–Jul	2013

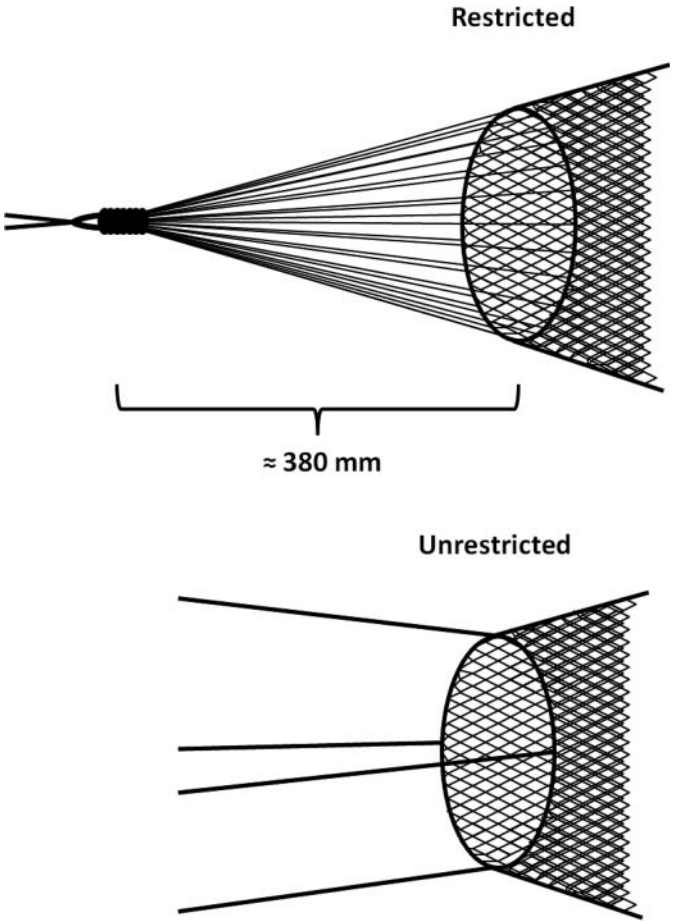

FIGURE 1. Depiction of restricted and unrestricted throat configurations for the modified fyke nets used during the study.

nets were lifted; fish were removed, measured, and inspected for marks; and the nets were again redeployed at a new location and were stocked with newly marked fish. Recaptured fish were used to estimate escapement, whereas newly captured (unmarked) fish were used to estimate differences in CPUE and size structure. The newly captured fish were likewise marked with a day-specific fin clip and were used for the next day's escapement trial. Recaptured fish were released to reduce stress-induced mortality. Using this paired design with equivalent stocking rates for the nets within each pair, we were able to simultaneously collect escapement data and perform a paired-gear comparison.

Data analysis.—For a given species and a given net type, mean CPUE was calculated as either the total number of fish (i.e., all sizes) or the number of stock-length and larger individuals (TL $\geq$ 20% of world-record length; Gabelhouse 1984) that were captured per 24-h set; CPUEs were only calculated when at least 30 fish were sampled between both net types. Comparisons of mean CPUE (all individuals or stock-sized and larger fish) between net types were performed using generalized linear mixed-effects modeling (family = Poisson). The modified fyke-net catch (Catch) was modeled as a function of throat restriction type (Type), net pairing (Net Pairing), and study lake (Lake) and was expressed as

$$\text{Catch} \sim \text{Type} + (1\,|\,\text{Net Pairing}) + (1\,|\,\text{Lake}) + \varepsilon, \quad (1)$$

where Type is a fixed effect and Net Pairing and Lake are random effects. Net Pairing was included as a random effect because catch was highly variable between net deployment locations. Model assumptions were assessed visually via residual plots (Zuur et al. 2009). We tested the significance of Type by using a likelihood ratio test wherein the full model (equation 1) was tested against a null model that excluded the fixed effect of Type (Zuur et al. 2009). Differences in size selectivity between throat restriction types were assessed using linear mixed-effects modeling. For the three most abundant species (i.e., Black Bullhead *Ameiurus melas*, Black Crappie, and Bluegill), we modeled the mean TL of all conspecifics captured per net as a function of Type, Net Pairing, and Lake,

$$\text{Mean TL} \sim \text{Type} + (1\,|\,\text{Net Pairing}) + (1\,|\,\text{Lake}) + \varepsilon, \quad (2)$$

which was similar to our analysis comparing catch between throat restriction types across net pairings and lakes. Net Pairing was again included as a random effect because mean TL was highly variable between locations of net deployment. Model assumptions were assessed visually via residual plots (Zuur et al. 2009). Likelihood ratio tests were used to identify the significance of Type in explaining differences in mean TL. For all mixed-effects modeling, we excluded Lake as a random effect for species that were only collected in one lake.

Overall escapement rates were species specific and were calculated as the proportion of marked fish (across all lakes) that were absent from the net after 24 h. We used logistic regression to model the relationship between the density of conspecific fish stocked into the net (independent variable) and fish escapement (dependent variable) for the three most abundant species: the Black Bullhead, Black Crappie, and Bluegill. For these analyses, we fitted our models to count data (i.e., the initial density of stocked fish and the number of fish that escaped per net) by assuming a Poisson distribution (link = log), with individual net sets serving as the replicate unit. Logistic regression models were plotted by treating mortalities in the net as "retained" because for all three species, the same trend was observed regardless of whether mortalities were included or excluded. Pearson's product-moment correlation was used to investigate (1) whether species-specific mortality was correlated with stocking density and (2) whether stocking density was correlated with the catch of new (unmarked) fish. Size-selective escapement was explored by using an upper-tailed paired *t*-test to compare the overall mean TL of fish stocked into a net with the overall mean TL of fish that were retained in that net the next day. All tests assumed an α of

TABLE 2. Number of fish captured and mean CPUEs for all individuals and for stock-length and larger individuals in modified fyke nets with restricted or unrestricted throats, deployed at five eastern South Dakota lakes during June 2013 and June–October 2014. Generalized linear mixed-effects models of CPUE, which included (full model) or excluded (null model) throat configuration as a fixed effect, were compared by using the likelihood ratio test, and results are reported below (asterisks denote significant differences). Lake was used as a random effect for all species except the Channel Catfish and White Crappie.

	Catch		Mean CPUE ± SE			
Species	Restricted net	Unrestricted net	Restricted net	Unrestricted net	χ^2 (df = 1)	*P*
Stock-length and larger fish						
Black Bullhead *Ameiurus melas*	1,937	940	52.35 ± 15.75	22.59 ± 10.97	449.42	<0.001*
Black Crappie *Pomoxis nigromaculatus*	385	100	6.62 ± 0.97	1.60 ± 0.24	187.60	<0.001*
Bluegill *Lepomis macrochirus*	697	469	10.72 ± 2.08	6.20 ± 1.02	79.54	<0.001*
Channel Catfish *Ictalurus punctatus*	51	8	10.20 ± 3.02	1.40 ± 0.87	37.68	<0.001*
Northern Pike *Esox lucius*	22	16	0.92 ± 0.18	0.58 ± 0.15	1.79	0.181
Rock Bass *Ambloplites rupestris*	20	22	1.25 ± 0.37	1.38 ± 0.52	0.10	0.758
Smallmouth Bass *Micropterus dolomieu*	30	11	1.20 ± 0.17	0.44 ± 0.22	9.15	0.002*
Walleye *Sander vitreus*	15	22	0.58 ± 0.22	0.96 ± 0.19	2.21	0.137
White Crappie *Pomoxis annularis*	5	9	0.60 ± 0.40	1.60 ± 0.4	2.36	0.123
All lengths						
Black Bullhead	1,937	942	52.35 ± 15.75	22.65 ± 10.97	447.40	<0.001*
Black Crappie	464	601	7.29 ± 1.06	9.41 ± 3.95	17.12	<0.001*
Bluegill	773	570	11.71 ± 2.40	7.15 ± 1.13	59.64	<0.001*
Channel Catfish	51	8	10.20 ± 3.02	1.40 ± 0.87	37.68	<0.001*
Northern Pike	22	17	0.88 ± 0.18	0.60 ± 0.14	1.33	0.248
Rock Bass	20	24	1.25 ± 0.37	1.50 ± 0.58	0.36	0.546
Smallmouth Bass	38	44	1.15 ± 0.20	1.22 ± 0.36	0.06	0.812
Walleye	15	27	0.58 ± 0.22	1.04 ± 0.20	3.22	0.073
White Crappie	13	71	1.38 ± 1.02	3.75 ± 1.00	9.15	0.002*

0.05, and computations were performed using R version 3.2.1 (R Development Core Team 2013).

RESULTS

For the most commonly sampled species (including Black Bullhead, Black Crappie, Bluegill, Channel Catfish, and Smallmouth Bass *Micropterus dolomieu*), the use of fyke nets with restricted throats approximately doubled the CPUE of stock-length and larger fish in comparison with the use of unrestricted nets (Table 2). There was no instance in which the CPUE of stock-length and larger fish was significantly higher for unrestricted nets than for restricted nets. When the total catch (all sizes of fish) was analyzed, restricted nets still yielded higher CPUEs for Black Bullheads, Bluegills, and Channel Catfish, whereas unrestricted nets had higher CPUEs for Black Crappies and White Crappies. Channel Catfish and White Crappies were sampled only in Lake Mitchell (Table 2). No difference was detected in the mean TL of captured Black Bullheads between net types; however, unrestricted nets selected for smaller Black Crappies and smaller Bluegills (Table 3). Due to low sample sizes, we did not conduct comparisons of size structure for Channel Catfish,

TABLE 3. Mean TLs (mm) of Black Bullheads, Black Crappies, and Bluegills that were sampled by using modified fyke nets with restricted or unrestricted throats in five eastern South Dakota lakes. Linear mixed-effects models of mean TL, which included (full model) or excluded (null model) throat configuration as a fixed effect, were compared by using the likelihood ratio test, and results are reported below (asterisks denote significant differences).

	Mean TL ± SE			
Species	Restricted net	Unrestricted net	χ^2 (df = 1)	*P*
Black Bullhead	291 ± 6	287 ± 6	0.25	0.617
Black Crappie	254 ± 7	223 ± 11	8.02	0.005*
Bluegill	190 ± 4	169 ± 6	14.48	<0.001*

Northern Pike, Rock Bass, Walleyes, Smallmouth Bass, or White Crappies.

Combined mortality of stocked Bluegills and Black Crappies ranged from 0% in Pickerel Lake to 46% in Enemy Swim Lake; higher mortality was observed for Bluegills in restricted nets than in unrestricted nets ($t = -1.89$, df $= 11$, $P = 0.042$), whereas the mortality of Black Crappies did not differ between net types ($t = -0.89$, df $= 6$, $P = 0.204$). For Black Crappies, mortality was not correlated with conspecific stocking density in either restricted ($r = 0.629$, $t = 1.40$, df $= 3$, $P = 0.256$) or unrestricted ($r = -0.395$, $t = -0.744$, df $= 3$, $P = 0.511$) nets. However, Bluegill mortality was positively correlated with conspecific stocking density in both restricted ($r = 0.919$, $t = 6.17$, df $= 7$, $P < 0.001$) and unrestricted ($r = 0.874$, $t = 4.401$, df $= 6$, $P = 0.005$) nets. We assumed that mortalities were related to stress from handling and warm water temperatures, which was exacerbated by the inability to escape from the net.

The relationship between the number of escapees per net and the conspecific stocking density could only be modeled for Black Bullheads, Black Crappies, and Bluegills due to low sample sizes for the other species (Figure 2). Throat configuration did not significantly influence the escapement rates of Black Bullheads; approximately half of the stocked Black Bullheads escaped regardless of throat configuration. In contrast, the escapement of Black Crappies and Bluegills was highly influenced by throat configuration. Overall escapement of Black Crappies from restricted nets was 4.4%, whereas escapement from unrestricted nets was 71.7% (Table 4). Nearly all of the Black Crappies that escaped did so from unrestricted nets, and their escapement increased with conspecific stocking density (Figure 2). Bluegills followed a similar pattern, with 10.3% escapement from restricted nets and 58.4% escapement from unrestricted nets. Bluegills that escaped the restricted nets tended to be smaller, thereby leaving larger individuals behind in the nets; the same was true of Black Bullheads that escaped from unrestricted nets (Table 5).

For several species and both throat configurations, conspecific stocking density was positively correlated with the number of new fish that were captured the next day. Higher stocking densities of Black Bullheads were correlated with higher catches of new conspecifics in restricted ($r = 0.511$, $t = 2.223$, df $= 14$, $P = 0.043$) and unrestricted ($r = 0.501$, $t = 2.241$, df $= 15$, $P = 0.041$) nets. Black Crappie stocking density was positively correlated with the catch of new conspecifics in restricted nets ($r = 0.510$, $t = 2.844$, df $= 23$, $P = 0.009$) but not in unrestricted nets ($r = 0.025$, $t = 0.109$, df $= 19$, $P = 0.915$). Bluegill stocking density did not influence the capture of new conspecifics in restricted nets ($r = 0.206$, $t = 1.155$, df $= 30$, $P = 0.257$), but the opposite was true for unrestricted nets ($r = 0.556$, $t = 3.414$, df $= 26$, $P = 0.002$). For all correlation analyses, less than 31% of the variability in the catch of new fish was explained by the conspecific stocking density within either net type.

DISCUSSION

Failure to account for CPUE, size structure, and escapement differences resulting from the inclusion or exclusion of restricted throats in fyke nets would likely influence CPUE calculations and subsequent management decisions. Previous comparisons have concluded that restricted throats reduce fish escapement, although those studies focused on Channel Catfish that were captured with hoop nets (Guy et al. 2009; Porath et al. 2011). Our findings corroborate the idea that restricted throats reduce the escapement of targeted fish species during sampling with passive entrapment gears and expand this understanding to modified fyke nets.

The similarity in escapement rates for Black Bullheads in restricted and unrestricted nets was unexpected because we captured this species at a higher rate in the restricted nets. In a hatchery raceway experiment, Porath et al. (2011) found that the escapement of ictalurids from unrestricted nets increased with increasing conspecific density. Our stocked Black Bullheads had already been in the nets overnight and may have been more adept at escaping when given the extra 24-h period after restocking. Our escapement trials for this species might have been improved by using a different type of gear for initial capture.

During escapement trials, many of the restricted nets recaptured more marked Bluegills and Black Crappies than were originally stocked into the net (Figure 2). These observations were likely due to high actual retention in the restricted nets and to the interception of a few marked fish that had escaped from unrestricted nets nearby. Because fish were not individually marked, we were unable to determine the proportion of unrestricted-net escapees that were subsequently captured in the restricted nets during the same 24-h period. This observation indicates that for Bluegills and Black Crappies, escapement from the restricted nets was slightly underestimated. However, we contend that this caveat does not conflict with our finding that modified fyke nets with restricted throats had lower escapement rates for these species.

Differences between the CPUE of all individuals and the CPUE of stock-length and larger fish produced conflicting results for Black Crappies and White Crappies: CPUE was higher in restricted nets when only stock-length and larger fish were considered, whereas CPUE was higher in unrestricted nets when all fish sizes were included in the comparison. The smallest crappies (<130 mm TL) appeared to be less likely to pass through restricted throats and more likely to swim through unrestricted throats. We caution that this observation was heavily influenced by several large catches from a few unrestricted nets in Lake Mitchell; furthermore, White Crappies were only sampled in Lake Mitchell. Our sample size for crappies smaller than stock length was too low to be conclusive.

Lower escapement rates of Black Crappies and Bluegills from restricted nets may indicate that once these cover-seeking fish became trapped, they are less willing or less able to leave

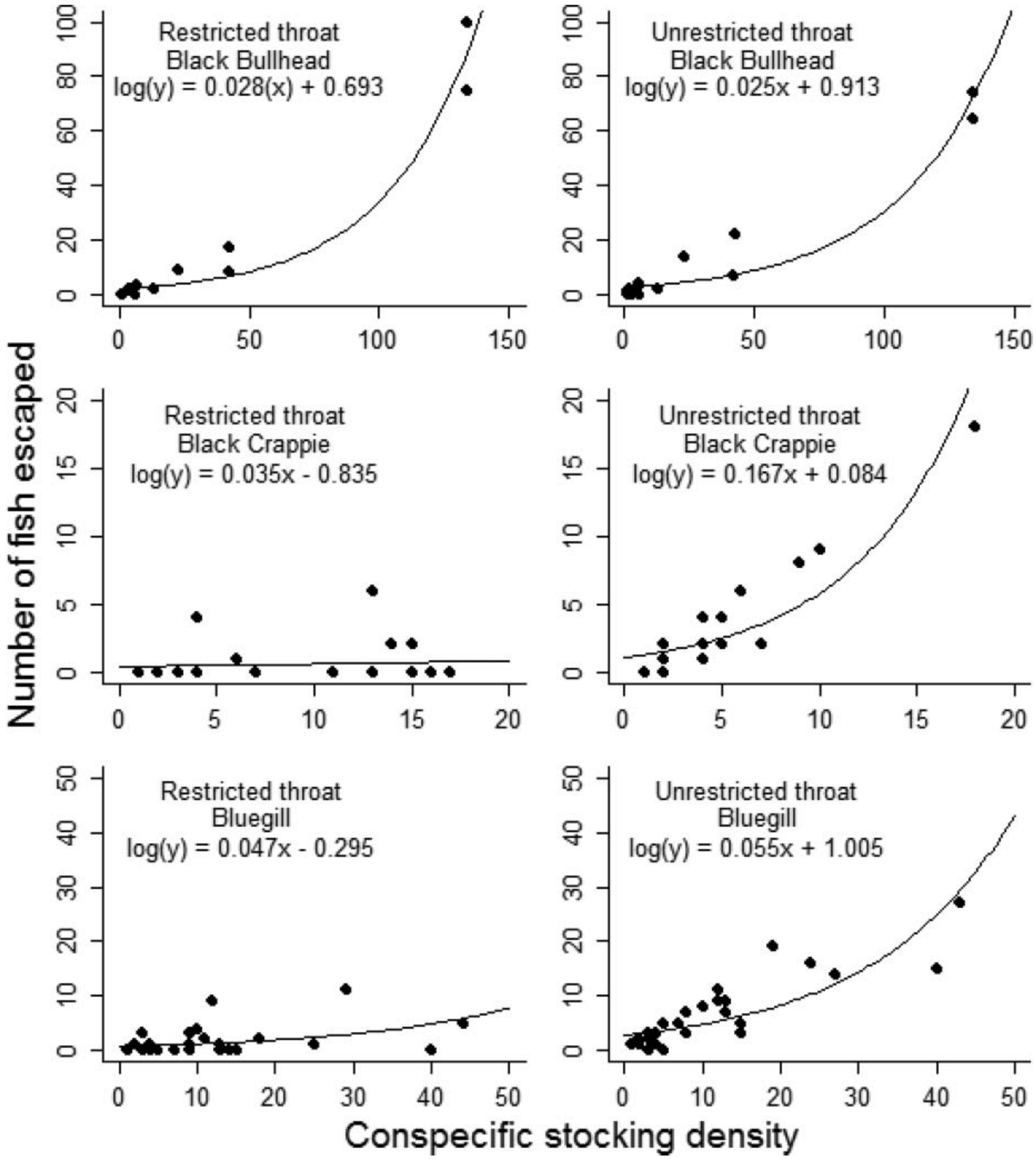

FIGURE 2. Relationship between the initial density of conspecifics stocked in modified fyke nets with restricted (left panels) or unrestricted (right panels) throats and the number of stocked fish that subsequently escaped, as modeled for Black Bullheads (upper panels), Black Crappies (middle panels), and Bluegills (lower panels). Logistic regression (assuming a Poisson distribution) was used to fit all models.

than their counterparts in the unrestricted nets. Fish escapement rates are known to decline at increasing conspecific densities (Breen and Ruetz 2006). Researchers have speculated that fish are attracted to aggregations of their conspecifics, making passive gears particularly effective (Munro 1974). We made similar observations for Black Bullheads and Black Crappies in restricted nets and for Black Bullheads and Bluegills in unrestricted nets. However, we conclude that throat configuration was the dominant factor explaining CPUE differences between restricted and unrestricted nets and that the attraction of fish into the nets played a limited role if any. Results from the Bluegill analyses illustrate this point. Across all waters, only 10.3% of all Bluegills that were stocked into restricted nets escaped, and there was no detectable correlation between Bluegill stocking density and the catch of new, unmarked conspecifics. Our finding that smaller Bluegills

TABLE 4. Total number of fish that were stocked into modified fyke nets with restricted or unrestricted throats, the number of fish that were retained in the nets after 24 h, and the number of mortalities within the nets after 24 h. Escapement rates for each species from each net type were calculated without adjustment for mortality. Escapement trials were performed in five eastern South Dakota lakes during June 2013 and June–October 2014.

	Number of fish			
Species	Stocked	Retained	Mortalities	Escapement (%)
Restricted nets				
Black Bullhead	419	201	0	52.0
Black Crappie	206	197	13	4.4
Bluegill	341	306	72	10.3
Channel Catfish	21	9	0	57.1
Northern Pike	4	4	1	0.0
Rock Bass	10	8	2	20.0
Smallmouth Bass	36	25	5	30.6
Walleye	7	5	0	28.6
Unrestricted nets				
Black Bullhead	425	229	0	46.1
Black Crappie	92	26	7	71.7
Bluegill	305	127	37	58.4
Channel Catfish	21	14	0	33.3
Northern Pike	12	10	2	16.7
Rock Bass	11	8	1	27.3
Smallmouth Bass	19	8	3	57.9
Walleye	9	6	1	33.3

selectively escaped from restricted nets—thus leaving behind larger individuals—verifies earlier studies that have observed escapement of smaller centrarchids from fyke nets (Latta 1959; Patriarche 1968). Failure to detect a similar finding for unrestricted nets was likely due to the open throat, which allowed for high escapement of all Bluegills.

We are confident that differences in fish CPUE, escapement rate, and size-selective escapement were due to differences in throat configuration. We investigated only two potential throat configurations, but other throat types (e.g., fingered) exist. Future studies should investigate the effectiveness of other throat configurations for use with different fish communities. Due to limited sample sizes for many species, we were only able to perform in-depth analyses for Black Bullheads, Black Crappies, and Bluegills, but the results might have differed for other species. Our findings will likely be of interest to managers of *Pomoxis* spp. and *Lepomis* spp. populations, as these fishes are commonly surveyed by using modified fyke nets (Miranda and Boxrucker 2009). We conclude that managers and researchers should be cognizant of the manner in which varying throat configurations can affect catch dynamics when sampling is conducted with North American standard modified

TABLE 5. Mean differences in TL (with lower confidence limit [CL]) between marked and retained Black Bullheads, Black Crappies, and Bluegills that were captured in modified fyke nets with restricted or unrestricted throats. Results of upper-tailed paired *t*-tests using individual nets as replicates are shown (asterisks denote significant differences).

Species	Mean TL difference (mm)	Lower 95% CL	*t*	df	*P*
Restricted nets					
Black Bullhead	2.25	−4.34	0.60	15	0.279
Black Crappie	0.77	−4.29	0.26	23	0.399
Bluegill	8.99	3.61	2.84	30	0.004*
Unrestricted nets					
Black Bullhead	12.30	5.63	3.25	14	0.003*
Black Crappie	11.71	−9.09	1.00	12	0.168
Bluegill	0.30	−11.32	0.04	20	0.483

fyke nets or other types of modified fyke net. Furthermore, we urge researchers to report the presence or absence of throat restriction (including throat diameter) when describing gear specifications, as these features may lead to bias in catches. The present study demonstrates the need to standardize not only the overall net dimensions but also the throat configuration of modified fyke nets when sampling freshwater fishes.

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